Evans Residence

Technical Information Report

March 8, 2016

Prepared for

Dallas Evans
8331 NE Juanita Drive
Kirkland, WA 98034
(206) 953-6099 tel

Submitted by

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33400 8th Avenue S, Suite 205
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TECHNICAL INFORMATION REPORT
FOR
EVANS RESIDENCE

Prepared for:
Dallas Evans
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Kirkland, WA 98034

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33400 8th Avenue S, Suite 205
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March 8, 2016

Job No. 1898-001-016

Approved By:

City of Kirkland

Date

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1. PROJECT OVERVIEW

The proposed Evans Residence project consists of a partial redevelopment located on three lots along NE Juanita Drive, just to the east of the intersection with 83rd Ave NE. The project is located in Section 31 of Township 26, Range 05 East in the City of Kirkland, WA. The plat incorporates the parcels numbered 376050-0240 ("Lot A"), 376050-0241 ("Lot B"), and 376050-0242 ("Lot C"). See Figure 1.1 for the Vicinity Map.

The existing 1.21 acre 3-lot project site consists of 2 single-family dwellings (one on Lot A and the other on Lot C) with associated driveway and outbuildings. The dwelling on Lot A has access from NE Juanita Drive and the dwelling on Lot C has access from the parcel to the north. The existing site slopes to the southeast at a general slope of approximately 17%. The pervious portions of the site are generally forested or lawn. See Figure 1.2 for the Existing Site Conditions.

The existing residence on Lot A will be demolished as a part of this project, and a new residence will constructed on Lot B. The project also proposes to create a new driveway access. As part of future redevelopment, to be permitted at a later date, Lot A may be developed with a new residence and on Lot C, the existing residence will be demolished and a new residence will be constructed. See Figure 1.3 for the Proposed Site Conditions.

According to the Geotechnical Engineering Report (GER) prepared by PanGEO, Inc. dated October 16, 2015, the soils on the project site consist of surficial topsoil over sandy recessional outwash with silt, followed by dense advance outwash consisting of gray, fine to coarse sand with gravel. It should be noted that this report is only being used for soils information, and not for shoring activity. The proposed Lot B building footprint has been revised and will no longer require shoring, as the report originally indicated. See the GER in Section 6 for more details.

Stormwater requirements for all three lots are addressed in this Technical Information Report (TIR), following the City of Kirkland Addendum to the 2009 King County Surface Water Design Manual (KCSWDM) and the 2009 KCSWDM, which will be collectively referred to as the SWDM. Lot A is estimated to require Targeted Drainage Review Category #1, due to steeper slopes. Lots B and C are estimated to require Small Project Drainage Review Type II.

Figure 1.1
Vicinity Map

VICINITY MAP

NTS

Figure 1.2
Existing Site Conditions

TOPOGRAPHIC & BOUNDARY SURVEY

BASIS OF BEARINGS

PER RECORD OF SURVEY BOOK 28/ PAGE 284, THE NORTHEASTERLY LINE OF THRACT 40 BEARS N56°37'47"W BETWEEN FOUND REBAR AND CAPS AND POINTS "A" AND "B".

REFERENCES

1. JUANITA POINT, A RESIDENCE PARK, RECORDED IN VOLUME 25 OF PLATS, PAGE 27, RECORDS OF KING COUNTY, WASHINGTON
2. POLIAK TESTAMENTARY SUBDIVISION, RECORDED UNDER RECORDING NUMBER 20071001001233
3. RECORD OF SURVEY, BOOK 28, PAGE 284, RECORDS OF KING COUNTY WASHINGTON

VERTICAL DATUM

NAVD 88

SURVEYOR'S NOTES

1. THE TOPOGRAPHIC SURVEY SHOWN HEREON WAS PERFORMED IN OCTOBER OF 2014/ MARCH OF 2015. THE FIELD DATA WAS COLLECTED AND RECORDED ON MAGNETIC MEDIA THROUGH AN ELECTRONIC THEODOLITE. THE DATA FILE IS ARCHIVED ON DISC OR CD. WRITTEN FIELD NOTES MAY NOT EXIST. CONTOURS ARE SHOWN FOR CONVENIENCE ONLY. DESIGN SHOULD RELY ON SPOT ELEVATIONS.
2. BURIED UTILITIES SHOWN BASED ON RECORDS FURNISHED BY OTHERS AND VERIFIED WHERE POSSIBLE IN THE FIELD. GEODIMENSIONS ASSUMES NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS OR ACCEPT RESPONSIBILITY FOR UNDERGROUND LINES WHICH ARE NOT MADE PUBLIC RECORD. FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO DESIGN CONTACT THE UTILITY OWNER/AGENCY. AS ALWAYS, CALL 1-800-424-5555 BEFORE CONSTRUCTION.
3. SUBJECT PROPERTY TAX PARCEL NO. 376050-0242
4. SUBJECT PROPERTY AREA PER THIS SURVEY IS 20,163± S.F. 0.4629± ACRES)
5. THIS SURVEY WAS PERFORMED WITH REFERENCE TO A TITLE REPORT FROM FIRST AMERICAN TITLE, COMMITMENT NO.: 4209-2240237; AND WITH REFERENCE TO A TITLE REPORT FROM STEWART TITLE COMPANY, ORDER NUMBER: 1148-40694, FEBRUARY 20, 2015 AT 8:00 AM.
6. INSTRUMENTATION FOR THIS SURVEY WAS A TRIMBLE ELECTRONIC DISTANCE MEASURING UNIT. PROCEDURES USED IN THIS SURVEY WERE DIRECT AND REVERSE ANGLES, NO CORRECTION NECESSARY. MEETS STATE STANDARDS SET BY WAC 332-130-090.
7. UNDERGROUND UTILITY LOCATIONS ARE ONLY APPROXIMATE. FOR ACCURATE LOCATIONS A UTILITY LOCATING SERVICE MUST BE HIRED TO VERIFY ACTUAL UTILITY LOCATIONS.

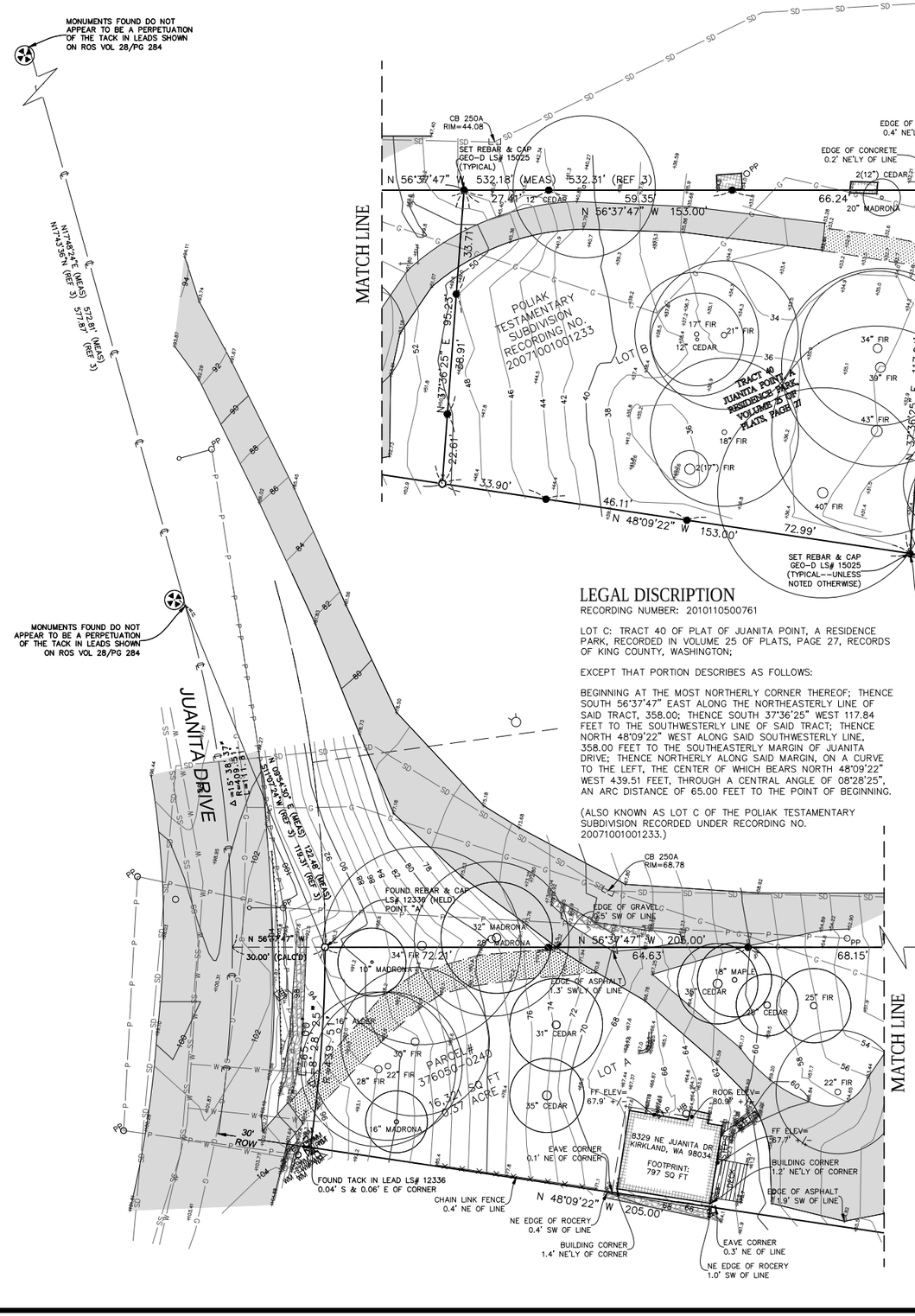
LEGEND

- ASPHALT SURFACE
- BUILDING
- CENTERLINE ROW
- CONCRETE SURFACE
- CONCRETE WALL
- DECK
- EASEMENT--ITEM #10
- FIRE HYDRANT
- G — GAS LINE
- GAS VALVE
- GRAVEL SURFACE
- GUARDRAIL
- INLET (TYPE 250A)
- NAIL AS NOTED
- MAILBOX
- MONUMENT (FOUND)
- POWER METER
- P — POWER (OVERHEAD)
- POWER POLE
- PP — POWER POLE W/ LIGHT
- REBAR AS NOTED--FOUND
- REBAR & CAP--SET (LS# 15025)
- ROCKERY
- SS — SEWER LINE
- SEWER MAINTENANCE
- SD — STORM DRAIN LINE
- SIZE TYPE — TREE (AS NOTED)
- W — WATER LINE
- WM — WATER METER

VICINITY MAP

N.T.S.

0.50 in



LEGAL DISCRIPTION

RECORDING NUMBER: 2010110500761

LOT C: TRACT 40 OF PLAT OF JUANITA POINT, A RESIDENCE PARK, RECORDED IN VOLUME 25 OF PLATS, PAGE 27, RECORDS OF KING COUNTY, WASHINGTON;

EXCEPT THAT PORTION DESCRIBES AS FOLLOWS:

BEGINNING AT THE MOST NORTHERLY CORNER THEREOF; THENCE SOUTH 56°37'47" EAST ALONG THE NORTHEASTERLY LINE OF SAID TRACT, 358.00; THENCE SOUTH 37°36'25" WEST 117.84 FEET TO THE SOUTHWESTERLY LINE OF SAID TRACT; THENCE NORTH 48°09'22" WEST ALONG SAID SOUTHWESTERLY LINE, 358.00 FEET TO THE SOUTHEASTERLY MARGIN OF JUANITA DRIVE; THENCE NORTHERLY ALONG SAID MARGIN, ON A CURVE TO THE LEFT, THE CENTER OF WHICH BEARS NORTH 48°09'22" WEST 439.51 FEET, THROUGH A CENTRAL ANGLE OF 08°28'25", AN ARC DISTANCE OF 65.00 FEET TO THE POINT OF BEGINNING.

(ALSO KNOWN AS LOT C OF THE POLIAK TESTAMENTARY SUBDIVISION RECORDED UNDER RECORDING NO. 20071001001233.)

SCHEDULE "B" ITEMS (COMMITMENT NO. 4209-2240237)

ITEM 9
EASEMENT, INCLUDING TERMS AND PROVISIONS CONTAINED THEREIN:
RECORDING INFORMATION: 7103120308
IN FAVOR OF: NORTHEAST LAKE WASHINGTON SEWER DISTRICT, A MUNICIPAL CORPORATION
FOR: SANITARY SEWER
"NOT PLOTTED--AS CONSTRUCTED"

ITEM 10
EASEMENT, INCLUDING TERMS AND PROVISIONS CONTAINED THEREIN:
RECORDING INFORMATION: 8010210561
IN FAVOR OF: NORTHEAST LAKE WASHINGTON SEWER DISTRICT, A MUNICIPAL CORPORATION
FOR: SANITARY SEWERS
"PLOTTED"

SCHEDULE "B" ITEMS (COMMITMENT NO. 01148-40694)

ITEM# 8
RESTRICTIONS, EASEMENTS, DEDICATIONS, AND MATTERS CONTAINED ON THE FACE OF THE PLAT OF JUANITA POINT, A RESIDENCE PARK, AS RECORDED IN VOLUME 25 OF PLATS, PAGE(S) 27, AND ANY AMENDMENTS THERETO
(PLOTTED "B" LANE)

ITEM# 9
EXCEPTIONS AND RESERVATIONS AS CONTAINED IN INSTRUMENT:
FROM: CRAWFORD & CONOVER
RECORDED: JANUARY 7, 1926
RECORDING NO.: 2123109
(NOT SURVEY RELATED)

ITEM# 10
EXCEPTIONS AND RESERVATIONS AS CONTAINED IN INSTRUMENT:
RECORDED: MARCH 14, 1941
RECORDING NO.: 3151841
(NOT PLOTTED--BLANKET IN NATURE)

ITEM# 11
EASEMENT AND THE TERMS AND CONDITIONS THEREOF:
GRANTEE: NORTHEAST LAKE WASHINGTON SEWER DISTRICT
PURPOSE: SANITARY SEWER
AFFECTS: REFER TO SAID INSTRUMENT
RECORDED: OCTOBER 21, 1980
RECORDING NO.: 8010210561
(NOT SHOWN ON SURVEY EASEMENT IS ALONG THE SHORELINE OF LAKE WASHINGTON)

ITEM# 14
EASEMENT AND THE TERMS AND CONDITIONS THEREOF:
PURPOSE: DRIVEWAY
AFFECTS: REFER TO SAID INSTRUMENT
RECORDED: NOVEMBER 5, 2010
RECORDING NO.: 2010110500765
(APPROXIMATE LOCATION PLOTTED)

measure success

TOPOGRAPHIC & BOUNDARY SURVEY
SW 1/4 OF THE NW 1/4 OF SEC. 31, TWP. 26N., RGE. 05E., W.M.
TAX PARCEL NO. 376050-0242

EVANS RESIDENCE
8331 JUANITA DRIVE NE
KIRKLAND, WASHINGTON

GeoDimensions
GeoDimensions, Inc., 10801 Main Street, Suite 102, Bellevue, WA 98004
phone 425.458.4488 support@geodimensions.net www.geodimensions.net

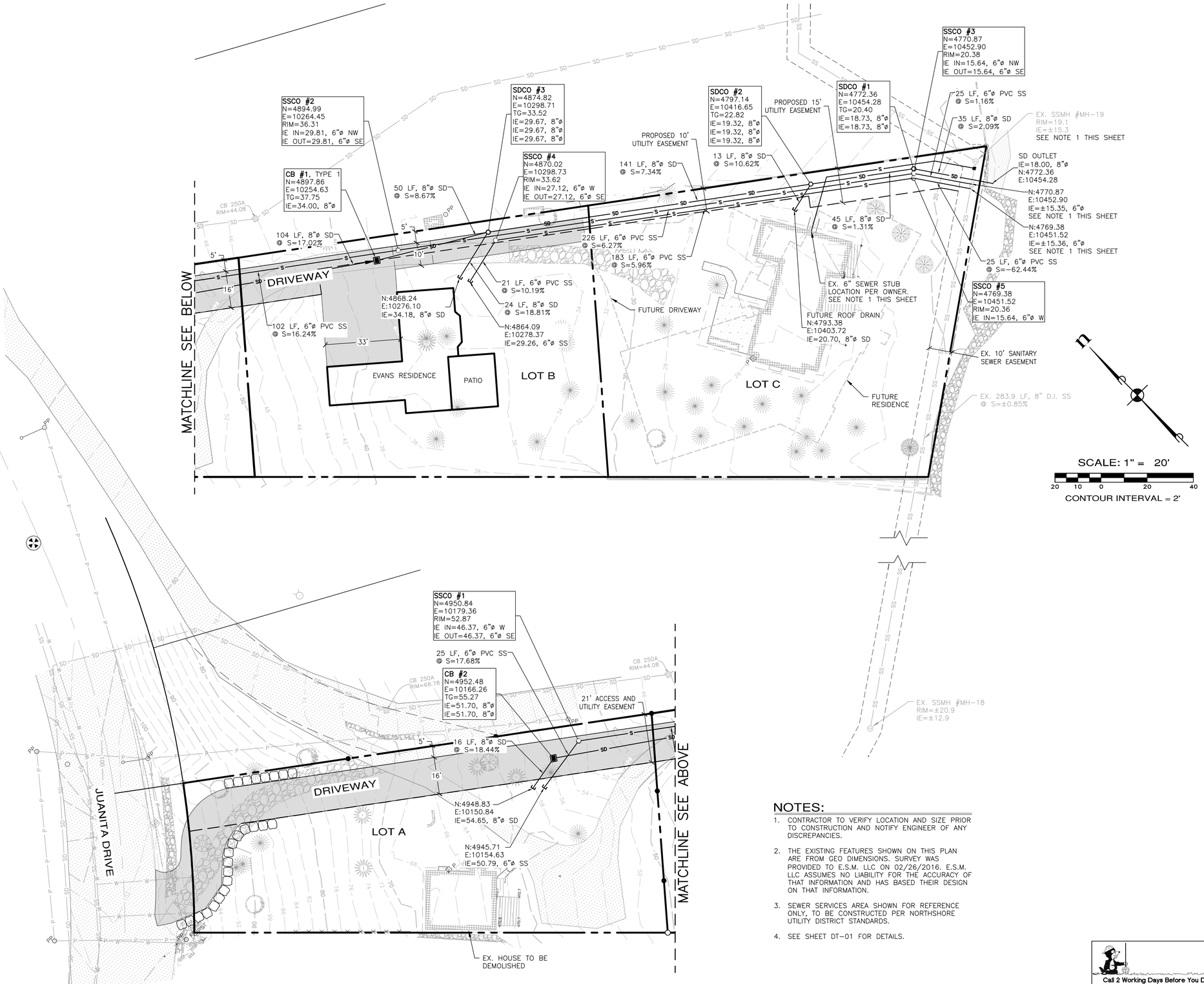
JOB NUMBER:	141282-G
DATE:	10/7/2015
DRAFTED BY:	TMC
CHECKED BY:	EJG/SRM
SCALE:	1"= 20'

REVISION HISTORY

SHEET NUMBER
1 OF 1

Figure 1.3
Proposed Site Conditions

A PORTION OF SW 1/4 OF THE NW 1/4 OF SEC. 31, TWP. 26N., RGE. 05E., W.M.



NOTES:

1. CONTRACTOR TO VERIFY LOCATION AND SIZE PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
2. THE EXISTING FEATURES SHOWN ON THIS PLAN ARE FROM GEO DIMENSIONS. SURVEY WAS PROVIDED TO E.S.M. LLC ON 02/26/2016. E.S.M. LLC ASSUMES NO LIABILITY FOR THE ACCURACY OF THAT INFORMATION AND HAS BASED THEIR DESIGN ON THAT INFORMATION.
3. SEWER SERVICES AREA SHOWN FOR REFERENCE ONLY, TO BE CONSTRUCTED PER NORTHSHORE UTILITY DISTRICT STANDARDS.
4. SEE SHEET DT-01 FOR DETAILS.

Call 2 Working Days Before You Dig
811
Utilities Underground Location Center
(ID,MT,ND,OR,WA)

REVISIONS

NO.	DESCRIPTION/DATE	BY

LAURA G. BARTENHAGEN — STATE OF WASHINGTON — 43111 — REGISTERED PROFESSIONAL ENGINEER

CONSULTING ENGINEERS, LLC
33400 8th Ave S, Suite 205
Federal Way, WA 98003
FEDERAL WAY (253) 838-6113
EVERETT (425) 258-9900
www.esmcivil.com
Civil Engineering
Public Works
Land Planning
Landscape Architecture
Land Surveying
Project Management

DALLAS EVANS

EVANS RESIDENCE

UTILITY PLAN

KIRKLAND WASHINGTON

JOB NO.:	1898-001-016
DWG. NAME:	UT-01
DESIGNED BY:	LBG
DRAWN BY:	CJR
CHECKED BY:	
DATE:	03/09/2016
DATE OF PRINT:	

UT-01

2 OF 3 SHEETS

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Plotted By: Carl Roberts

2. CONDITIONS AND REQUIREMENTS SUMMARY

Review of the 8 Core Requirements and 5 Special Requirements

This section describes how all three lots will meet the SWDM.

Lot A has been evaluated using Targeted Drainage Review Category #1 to meet the core and special requirements as outlined below. Lots B and C also meet these requirements, however, these two lots were evaluated using Small Project Drainage Review Type II, which is outlined on the next page of this section.

Core Requirement No. 1 Discharge at the Natural Location
In the existing condition, the site drains to the east into Lake Washington. In the proposed condition, stormwater runoff from all three lots will be tightlined and discharged east into Lake Washington, which is the natural discharge location for the project site.

Core Requirement No. 2 Off-site Analysis
An offsite analysis was performed for all three lots using available online resources. See Section 3 for the offsite analysis.

Core Requirement No. 3 Flow Control
Based on the direct discharge to Lake Washington exemption, all three lots are not required to meet Core Requirement 3. See Section 4 for more information.

Core Requirement No. 4 Conveyance System
The stormwater drainage conveyance system for all three lots has been sized conservatively to convey and contain the 100 year design storm event to the stormwater outfall, which is located on the east portion of the site into Lake Washington.

Core Requirement No. 5 Erosion and Sediment Control
The proposed project will include clearing and grading for the Lot B residence and the proposed driveway through Lot A. Erosion and sediment controls will be provided to prevent, to the maximum extent possible, the transport of sediment from the project site to Lake Washington. Clearing and grading for any redevelopment on Lots A and C will be designed at a later date, as part of a separate permit approval.

Core Requirement No. 6 Maintenance and Operations
Based on the drainage review designations for all three lots, the project site is not required to meet Core Requirement 6.

Core Requirement No. 7 Financial Guarantees and Liability
Based on the drainage review designations for all three lots, the project site is not required to meet Core Requirement 6.

Core Requirement No. 8 Water Quality
Based on the drainage review designations for all three lots, the project site is not required to meet Core Requirement 6.

Special Requirement No. 1 Other Adopted Area-Specific Requirements
There are no master drainage plans, basin plans, salmon conservation plans, stormwater compliance plans, flood hazard reduction plan updates, or shared facility drainage plans for this project. Special Requirement No. 1 does not apply.

Special Requirement No. 2 Flood Hazard Area Delineation
While Lot C of the project site borders Lake Washington, there is no 100-year flood plain associated with a large body of water (i.e. lake or stream) on the site or adjacent to the site. Special Requirement No. 2 does not apply.

Special Requirement No. 3 Flood Protection Facilities
The project lies outside any pre-defined flood plain. Special Requirement No. 3 does not apply.

Special Requirement No. 4 Source Control
The project is a residential project and is not subject to this requirement. Special Requirement No. 4 does not apply.

Special Requirement No. 5 Oil Control
The project does not have a "high-use site characteristic" and is not a redevelopment of a high-use site. Special Requirement No. 5 does not apply.

Lots B and C were evaluated using Small Project Drainage Review Type II as outlined below:

Drainage Plan with flow control BMP site plan and design and maintenance details
See Section 4 of this report.

Drainage TIR with supporting documentation, include Downstream Analysis
This report serves as the TIR and Section 3 includes the downstream analysis for all three lots.

Summary of Low Impact Development (LID) Feasibility
See Section 4 of this report.

ESC Plan
See Section 6 of this report and sheet ER-01.

Furthermore, all three lots are subject to Policy L-1, Feasibility of LID. See Section 4 for more information.

3. OFF-SITE ANALYSIS

Task 1: Study Area Definition and Maps

Figure 1.2 shows the existing site conditions. There are no known offsite properties flowing to the project site and there are also no offsite properties in the downstream flowpath, as the project sheet flows directly into Lake Washington.

Task 2: Resource Review

- Soil Survey Map
  The GER indicates that the soil observed on the project site consists of thin surficial topsoil over red brown, sandy recessional outwash with silt, followed by dense advance outwash consisting of gray, fine to coarse sand with gravel. Further details and descriptions can be found in the GER attached in Section 6.

- King County iMap
  According to the King County GIS Viewer (iMap), the developed project site is NOT in any of the following areas:
  - 100 year floodplains
  - Coal Mine Hazard Areas
  - Seismic Hazard Areas

  The project site has the following areas mapped onsite:
  - Erosion Hazard Areas
  - Landslide Hazard Areas

- Washington State DOE 303(d) Impaired Water Body List
  The portion of Lake Washington that the project discharges to is not an impaired 303(d) water body.

- Road Drainage Problems
  None noted. Existing roads are uphill of project area.

- Wetlands Inventory
  According to iMap, there are no recorded wetlands on the developed project site.

- Migrating River Study
  None noted.

- Downstream Drainage Complaints
  According to the information available on iMap, there have been no downstream or adjacent drainage complaints in the study area within the last 10 years.

Task 3: Online Resource Inspection (Level 1 Inspection)

Based on the survey and satellite maps, the project site area sheet flows to the southeast directly into Lake Washington. The frontage road, NE Juanita Drive, is super-elevated and does not flow onto the project site.

Task 4: Drainage Description and Problem Descriptions

The project site sheet flows to the southeast, directly into Lake Washington.

Task 5: Mitigation of Existing or Potential Problems

Runoff from the site will be collected in a piped storm system and directly discharged into Lake Washington. See Section 4 for further information.

Figure 3.1
KCGIS Parcels Report/Environmental Hazards

King County

King County Districts and Development Conditions for parcel 3760500240

Parcel number	**3760500240**	Drainage Basin	**East Lake Washington - Kenmore South**
Address	**8329 NE JUANITA DR**	Watershed	**Cedar River / Lake Washington**
Jurisdiction	**Kirkland**	WRIA	**Cedar-Sammamish (8)**
Zipcode	**98034**	PLSS	**NW - 31 - 26 - 5**
Kroll Map page	**425**	Latitude	**47.69852**
Thomas Guide page	**506**	Longitude	**-122.22837**

Electoral Districts

Voting district	**KIR 01-3678**	Fire district	**does not apply**
King County Council district	**District 1, Rod Dembowski (206) 477-1001**	Water district	**does not apply**
		Sewer district	**does not apply**
Congressional district	**1**	Water & Sewer district	**Northshore Utility District**
Legislative district	**1**	Parks & Recreation district	**does not apply**
School district	**Lake Washington #414**	Hospital district	**Public Hospital District No. 2**
Seattle school board district	**does not apply (not in Seattle)**	Rural library district	**Rural King County Library System**
District Court electoral district	**Northeast**	Tribal Lands?	**No**

King County planning and critical areas designations

King County zoning	**NA, check with jurisdiction**	Potential annexation area	**does not apply**
		Rural town?	**No**
Development conditions	**None**	Water service planning area	**does not apply**
Comprehensive Plan	**um**	Roads MPS zone	**317**
Urban Growth Area	**Urban**	Transportation Concurrency Management	**does not apply**
Community Service Area	**does not apply**		
Community Planning Area	**Northshore**	Forest Production district?	**No**
Coal mine hazards?	**None mapped**	Agricultural Production district?	**No**
Erosion hazards?	**Yes**	Critical aquifer recharge area?	**None mapped**
Landslide hazards?	**Yes**	100-year flood plain?	**None mapped**
Seismic hazards?	**None mapped**	Wetlands at this parcel?	**None mapped**
		Within the Tacoma Smelter Plume?	**Non-Detect to 20.0 ppm** Estimated Arsenic Concentration in Soil

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Contact us at giscenter@kingcounty.gov.

King County

King County Districts and Development Conditions for parcel 3760500241

Parcel number	**3760500241**	Drainage Basin	**East Lake Washington - Kenmore South**
Address	**8331 NE JUANITA DR**	Watershed	**Cedar River / Lake Washington**
Jurisdiction	**Kirkland**	WRIA	**Cedar-Sammamish (8)**
Zipcode	**98034**	PLSS	**NW - 31 - 26 - 5**
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Thomas Guide page	**506**	Longitude	**-122.22785**

Electoral Districts

Voting district	**KIR 01-3678**	Fire district	**does not apply**
King County Council district	**District 1, Rod Dembowski (206) 477-1001**	Water district	**does not apply**
		Sewer district	**does not apply**
Congressional district	**1**	Water & Sewer district	**Northshore Utility District**
Legislative district	**1**	Parks & Recreation district	**does not apply**
School district	**Lake Washington #414**	Hospital district	**Public Hospital District No. 2**
Seattle school board district	**does not apply (not in Seattle)**	Rural library district	**Rural King County Library System**
District Court electoral district	**Northeast**	Tribal Lands?	**No**

King County planning and critical areas designations

King County zoning	**NA, check with jurisdiction**	Potential annexation area	**does not apply**
		Rural town?	**No**
Development conditions	**None**	Water service planning area	**does not apply**
Comprehensive Plan	**um**	Roads MPS zone	**317**
Urban Growth Area	**Urban**	Transportation Concurrency Management	**does not apply**
Community Service Area	**does not apply**		
Community Planning Area	**Northshore**	Forest Production district?	**No**
Coal mine hazards?	**None mapped**	Agricultural Production district?	**No**
Erosion hazards?	**Yes**	Critical aquifer recharge area?	**None mapped**
Landslide hazards?	**Yes**	100-year flood plain?	**None mapped**
Seismic hazards?	**None mapped**	Wetlands at this parcel?	**None mapped**
		Within the Tacoma Smelter Plume?	**Non-Detect to 20.0 ppm** Estimated Arsenic Concentration in Soil

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King County

King County Districts and Development Conditions for parcel 3760500242

Parcel number	**3760500242**	Drainage Basin	**East Lake Washington - Kenmore South *and* Water - Lake Washington**
Address	**Not Available**	Watershed	**Cedar River / Lake Washington**
Jurisdiction	**Kirkland**	WRIA	**Cedar-Sammamish (8)**
Zipcode	**98034**	PLSS	**NW - 31 - 26 - 5**
Kroll Map page	**425**	Latitude	**47.69783**
Thomas Guide page	**506**	Longitude	**-122.22759**

Electoral Districts

Voting district	**KIR 01-3678**	Fire district	**does not apply**
King County Council district	**District 1, Rod Dembowski (206) 477-1001**	Water district	**does not apply**
		Sewer district	**does not apply**
Congressional district	**1**	Water & Sewer district	**Northshore Utility District**
Legislative district	**1**	Parks & Recreation district	**does not apply**
School district	**Lake Washington #414**	Hospital district	**Public Hospital District No. 2**
Seattle school board district	**does not apply (not in Seattle)**	Rural library district	**Rural King County Library System**
District Court electoral district	**Northeast**	Tribal Lands?	**No**

King County planning and critical areas designations

King County zoning	**NA, check with jurisdiction**	Potential annexation area	**does not apply**
Development conditions	**None**	Rural town?	**No**
Comprehensive Plan	**um**	Water service planning area	**does not apply**
Urban Growth Area	**Urban**	Roads MPS zone	**317**
Community Service Area	**does not apply**	Transportation Concurrency Management	**does not apply**
Community Planning Area	**Northshore**	Forest Production district?	**No**
Coal mine hazards?	**None mapped**	Agricultural Production district?	**No**
Erosion hazards?	**Yes**	Critical aquifer recharge area?	**None mapped**
Landslide hazards?	**Yes**	100-year flood plain?	**None mapped**
Seismic hazards?	**None mapped**	Wetlands at this parcel?	**None mapped**
		Within the Tacoma Smelter Plume?	**Non-Detect to 20.0 ppm** Estimated Arsenic Concentration in Soil

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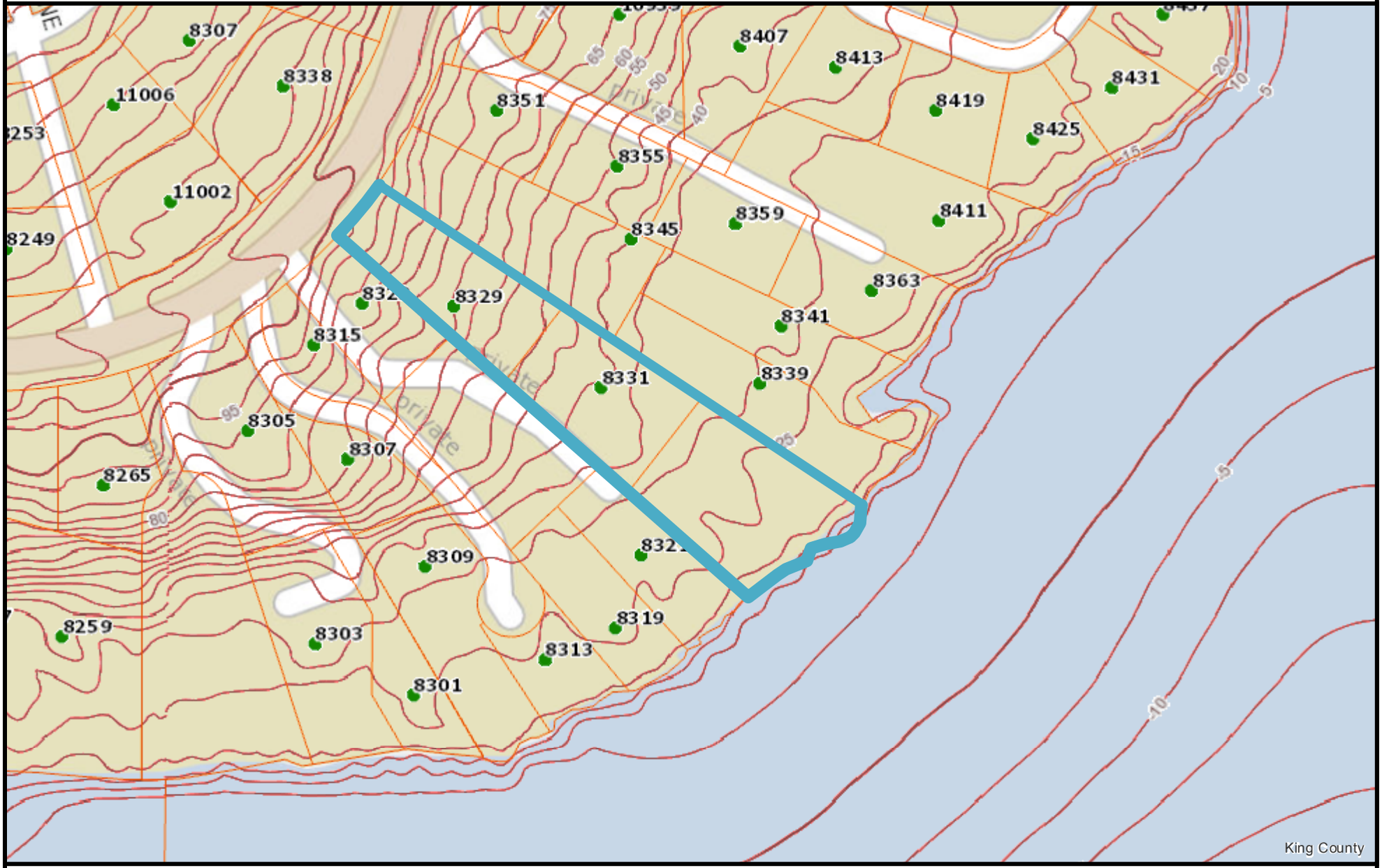
Figure 3.2
Site Topography

Evans Residence



Date: 3/2/2016 Notes:

King County
GIS Center

4. FLOW CONTROL & WATER QUALITY FACILITY ANALYSIS AND DESIGN

4.1 Existing Site Hydrology

The existing site consists of two single-family dwellings on Lots A and C with associated driveway and outbuildings. The existing site is sloped at approximately 17%, with a slope from the northwest to the southeast, towards Lake Washington. The pervious portions of the parcel are generally forested or lawn.

TABLE 4.1
Pre-Developed Tributary Area

SUBBASIN	Impervious Area (sf)	Pervious Area (sf)	Total Area (sf)
Lot A	4,719	11,602	16,321
Lot B	1,558	14,697	16,255
Lot C	3,978	16,302	20,280
Total	**10,255**	**42,601**	**52,856**

4.2 Developed Site Hydrology

The project will demolish the existing residence on Lot A, add a house in Lot B, and Lot C will remain untouched except for utility trenching and tree removal. Additionally, a new driveway access will be created to NE Juanita Drive and will allow access to all three lots.

TABLE 4.2
Proposed Disturbed Tributary Area

SUBBASIN	Impervious Disturbed Area (sf)	Pervious Disturbed Area (sf)	Total Disturbed Area (sf)
Lot A	3,558	1,281	4,839
Lot B	5,192	2,030	7,222
Lot C	0	2,081	2,081
Total	**8,750**	**5,392**	**14,142**

TABLE 4.3
Total Future Developed Tributary Area

SUBBASIN	Impervious Area (sf)	Pervious Area (sf)	Total Area (sf)
Lot A	8,160*	8,161	16,321
Lot B	5,192	11,063	16,255
Lot C	10,000*	10,280	20,280
Total	**23,352**	**29,504**	**52,856**

*Maximum future impervious area as allowed by SWDM and Kirkland Municipal Code

See Figure 1.3 for the Proposed Site Conditions.

4.3 Flow Control System

The project site, including all three lots, is exempt from flow control requirements based on the Direct Discharge Exemption. All three lots discharge directly into Lake Washington via a proposed storm tightline system.

4.4 Water Quality System

Based on the drainage review designations for all three lots, the project site is not required to meet Core Requirement 6.

4.5 LID Feasibility

Per Policy L-1 of the City of Kirkland, Targeted Drainage Review and Small Project Type II must evaluate the feasibility of LID as described below:

Full dispersion is not feasible, as there is not 50-100 feet of native vegetated flowpath available on the lots, without impacting the downstream lots.

Basic dispersion, infiltration, and rain gardens were also not considered feasible, due to the slopes on the project site being steeper than 15%, the project site having been mapped with erosion and landslide hazards, and the proximity to Lake Washington.

Permeable pavement was not considered feasible due to the driveway slopes on the project site being steeper than typical (2% to 5% range) allowed for permeable pavement.

Rainwater harvesting was not considered feasible due to the proximity to Lake Washington.

Vegetated roofs were not considered feasible. For Lot B residence, because the proposed house is an English cottage that will be brought onto the site and restored, the roof will be already a typical roof. For Lots A and C that are estimated to be redeveloped at a later date, it is unlikely that vegetated roofs would be considered feasible.

Reduced impervious surface credit is proposed for the Lot B residence. Lots A and C, at the time of redevelopment, will evaluate this credit for feasibility.

Native growth retention credit was not considered feasible due to the proposed development type and density.

In summary, LID feasibility has been evaluated, and the reduced impervious surface credit is proposed for Lot B. Lots A and C will also be evaluated for this credit at the time of redevelopment.

5. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The stormwater drainage conveyance system for all three lots has been sized conservatively to convey and contain the 100 year design storm event to the stormwater outfall, which is located on the east portion of the site into Lake Washington. A Hydraulic Project Approval (HPA) for the proposed stormwater outfall may be required by Washington Department of Fish and Wildlife.

The rooftops for Lot B and C will be basic dispersed, however they will be included in the conveyance calculation for capacity. Additionally, a similar sized house to Lot B will be assumed to be on Lot A, for future connectivity.

Rational Method
$Q = CI_RA$

C Value The stormwater tightline system is only collecting the driveway (and assumed walkways), therefore the C value will be C = 0.90.

I_R Value
$I_R = (P_R)(i_R)$

P_R = 3.55 (from Figure 3.2.1.D 100 year 24 hour Isopluvial from the SWDM)

$i_R = (a_R)(T_c)^{(-br)}$
aR = 2.61, bR = 0.63 from Table 3.2.1.B from the SWDM
T_C = 6.3 minutes (SWDM minimum)

$i_R = (2.61)(6.3)^{(-0.63)}$
$i_R = 0.819$

$I_R = (3.55)(0.819)$
$I_R = 2.91$

A Value (Area)
A = 23,352 sf (0.54 ac) impervious

$Q = CI_RA$
$Q = (0.90)(2.91)(0.54)$
Q = 1.41 cubic feet per second (cfs), 100 year storm

The proposed tightline system is an 8 inch diameter pipe, with a minimum slope of 2% which results in a pipe capacity of 1.71 cfs. This is well above the 100 year flowrate from the project site of 1.41 cfs, allowing for a 20% factor of safety.

Figure 5.1
Conveyance Calculation

Evans Residence Conveyance

8" Diameter Pipe Capacity

Sewer Pipes -- English Units

Civil Tools for Windows
(03-08-2016, 09:46:05)

Flowrate (cfs)	Diameter (in)	Friction ()	Slope (%)	Velocity (fps)
1.71	8.00	0.013	2.00	4.90

6. SPECIAL REPORTS AND STUDIES

Following are the reports and studies referenced for the proposed development:

- Geotechnical Engineering Report by PanGEO, Inc., dated October 16, 2015

PanGEO INCORPORATED
Geotechnical & Earthquake Engineering Consultants

October 16, 2015
File No. 15-057.100

Mr. Dallas Evans
8331 NE Juanita Drave
Kirkland, WA 98034

Subject: **Geotechnical Engineering Report**
Proposed Residence
8331 NE Juanita Drive, Lot B
Kirkland, Washington

Dear Mr. Evans,

As requested, PanGEO, Inc. has completed a geotechnical engineering study to assist you and the project team with the design and construction of the proposed single-family residence at the above-referenced address. This study was performed in general accordance with our mutually agreed scope of work, and authorization to perform the study was confirmed in your e-mail of August 25, 2015. Our service scope included reviewing readily available geologic and geotechnical data, examining the soils exposed in excavations you have previously conducted, and developing the conclusions and recommendations presented in this report.

SITE AND PROJECT DESCRIPTION

The subject site is located at 8331 NE Juanita Drive in Kirkland, Washington (see Vicinity Map, Figure 1). We understand that you wish to demolish an existing residential dwelling and construct a garage and single story house on the site at the location shown on Figure 2. As indicated on Figure 2, the site slopes to the southeast at a gradient of roughly 17 percent. The elevation of the site with the footprint of the new house varies from about 46 feet on the southeast to 60 feet on the northwest. The property is mapped as a Landslide Hazard Area by the City of Kirkland.

We understand that the proposed house will be a lightly loaded, wood frame, two-story structure with a large daylight basement. We understand that the foundation grade over most of the

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structure will be elevation 42 feet. There will also be a two-car garage at the west corner of the house, which will be at grade 56 feet. We anticipate that the lower level of the house will require a cut of approximately 14 to 15 feet at its deepest. We understand that the current plans for the house include a set-back from the adjacent property line of just under 15 feet. It may be possible to construct the structure with temporary 1H:1V open cuts on the uphill side of the site. However, temporary shoring may be locally required where an open cut would conflict with existing utilities or property lines.

The conclusions and recommendations in this report are based on our understanding of the proposed development, which is in turn based on the project information provided. If the above project description is incorrect, or the project information changes, we should be consulted to review the recommendations contained in this study and make modifications as needed.

SUBSURFACE EXPLORATIONS

Subsurface conditions at 8331 NE Juanita Drive were derived from the results of our prior study of the property in which three test pits (TP-1 to TP-3) were excavated to depths of about 6 to 7½ feet on March 10, 2015, at the locations shown on Figure 2. The test pits were supplemented by observations made on August 31st of the soil conditions in an excavation within the footprint of the new house. The logs of the previous explorations are summarized on Figures 3 thru 6 and subsurface conditions at the site are summarized below.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

SITE GEOLOGY

According to the Geologic Map of Kirkland (Minard, 1983), the project site is located in an area mapped as underlain by Transitional Beds or Advanced Outwash. Advanced outwash is described as gray, pebbly sand. The Transitional Beds are described as gray non-glacial and glacial silt to very fine sand. Both units tend to be very compact and capable of supporting lightly loaded structures like houses.

SOILS

The soils observed in the test pits consisted of thin (2 to 4 inches) surficial topsoil over red brown, sandy recessional outwash with silt, followed by dense advance outwash consisting of

gray, fine to coarse sand with gravel. In the excavation for the new house, the soil consisted of finely bedded silt and clay with sand and gravel (see Plate 1). This is consistent with upper portions of Minard's Transitional Beds, which have glacial lake sediments with gravel drop stones.

GROUNDWATER

Groundwater was not encountered in the test pits during excavation, nor was groundwater observed in the excavation for the planned house. However, groundwater seepage may be present within discontinuous sand lenses, especially in the wet season. It should be noted that groundwater elevations may vary depending on the season, local subsurface conditions, and other factors. Groundwater levels are normally highest during the winter and early spring.

Plate 1. Excavation showing dense, finely bedded soil.

GEOTECHNICAL DESIGN RECOMMENDATIONS

SEISMIC DESIGN PARAMETERS

The Table 1 below provides seismic design parameters for the site that are in conformance with the 2012 and later editions of the International Building Code (IBC), which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years), and the 2008 USGS seismic hazard maps:

Table 1 – Seismic Design Parameters per 2012 IBC

Site Class	Spectral Acceleration at 0.2 sec. (g) S_S	Spectral Acceleration at 1.0 sec. (g) S_1	Site Coefficients		Design Spectral Response Parameters	
			F_a	F_v	S_{DS}	S_{D1}
D	1.252	0.484	1.00	1.52	0.835	0.489

BUILDING FOUNDATIONS

Based on the subsurface conditions encountered at the site, it is our opinion that the proposed building may be supported on conventional spread and strip footings. The footings should bear on undisturbed native advanced outwash or Transitional bed soil, and/or on newly placed structural fill over advanced outwash deposits. The foundations should not bear on the silty recessional outwash which should be over excavated and replaced with structural fill. Perimeter foundations should be placed at a minimum depth of 18 inches below final exterior grade. Interior spread foundations should be placed at a minimum depth of 12 inches below the top of slab.

We recommend an allowable soil bearing pressure of 3,000 pounds per square feet (psf) for the design of the footings. This value may be increased by 33% for transient loads, such as wind or seismic forces. Continuous and individual spread footings should have minimum widths of 18 and 24 inches, respectively.

Footings designed as described above should have a total settlement of less than one inch, and differential settlement of less than ½ inch. Most of the anticipated settlement should occur during construction as dead loads are applied.

Lateral Resistance – Lateral loads on the structure may be resisted by passive earth pressure developed against the embedded portion of the foundation and by frictional resistance between the bottom of the foundation and the supporting subgrade. A coefficient of friction of 0.45 may be used for footings bearing on the dense native advanced outwash, Transitional Bed material or compacted sand/structural fill. Passive soil resistance may be calculated using an equivalent fluid weight of 300 pcf, assuming properly compacted structural fill will be placed against the footings. The above values include a factor of safety of 1.5. .

Perimeter Footing Drain – Footing drains should be installed around the perimeter of the building at the base of the footings. Under no circumstances should roof downspout drain lines be connected to the footing drain systems. Roof downspouts must be separately tightlined to appropriate discharge locations. Cleanouts should be installed at strategic locations to allow for periodic maintenance of the footing drain and downspout tightline systems.

Footing Subgrade Preparation – All footing subgrades should be carefully prepared. The adequacy of footing subgrade should be verified by a representative of PanGEO, prior to placing forms or rebar. This is especially important for the garage which may be underlain by recessional outwash. Any over-excavations should be backfilled with Control Density Fill (CDF) or

structural fill. It should be noted that the advanced outwash soils are not expected to be moisture sensitive, and may be used as structural fill. The recessional outwash may be moisture sensitive and may not be suitable as backfill when wet. Footing excavations should be observed by PanGEO to confirm that the exposed footing subgrade is consistent with the expected conditions and adequate to support the design bearing pressure.

FLOORS SLABS

Concrete slab-on-grade floors should be constructed on the undisturbed native advance outwash or compacted structural fill extending to the advance outwash. Slab-on-grade floors should be underlain by a capillary break consisting of at least of 4 inches of ¾-inch, clean crushed rock (less than 3 percent fines) compacted to a firm and unyielding condition. The capillary break should be placed on subgrade that has been compacted to a dense and unyielding condition. A 10-mil polyethylene vapor barrier should also be placed directly below the slab. We also recommend that control joints be incorporated into the floor slab to control cracking.

RETAINING AND BASEMENT WALLS

Retaining and basement walls should be properly designed to resist the lateral earth pressures exerted by the soils behind the walls. Proper drainage provisions should also be provided behind the walls to intercept and remove seepage or groundwater. Geotechnical recommendations for the design and construction of the retaining/basement walls are presented below.

Lateral Earth Pressures

Basement and retaining walls should be designed for an active pressure of 35 pcf for level backfills and 45 pcf for sloping ground conditions with a 2H:1V backslope. Restrained walls should be designed for at-rest pressures of 45 and 55 pcf for level and sloping ground, respectively. Additionally, all walls should be designed for an additional uniform lateral pressure of 6H psf for seismic loading, where H corresponds to the buried depth of the wall.

Lateral Resistance

Lateral forces from seismic loading and unbalanced lateral earth pressures may be resisted by a combination of passive earth pressures acting against the embedded portions of the foundations and by friction acting on the base of the foundations. Passive resistance values may be

determined using an equivalent fluid weight of 300 pcf. This value includes a factor of safety of 1.5. A friction coefficient of 0.45 may be used to determine the frictional resistance at the base of the footings. The coefficient includes a factor safety of 1.5.

Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe placed behind and at the base of the wall footings, embedded in 12 to 18 inches of clean crushed rock or pea gravel wrapped with a layer of filter fabric. Where applicable, in-lieu of conventional footing drains, weep holes (2" diameter and 10 feet on center) may be used for site retaining walls. A minimum 18-inch wide zone of free draining granular soils (i.e. pea gravel or washed rock) is recommended to be placed adjacent to the wall for the full height of the wall. Alternatively, a composite drainage material, such as Miradrain 6000, may be used in lieu of the clean crushed rock or pea gravel. The drainpipe at the base of the wall should be graded to direct water to a suitable outlet.

Wall Backfill

In our opinion, the existing on-site advanced outwash soil may be suitable as wall backfill as well as imported free draining granular material such as City of Seattle Type 17 or WSDOT Gravel Borrow. . In areas where the space is limited between the wall and the face of excavation, pea gravel may be used as backfill. The silty recessional outwash should not be used as structural fill, but may be used as general fill in landscaping areas.

Wall backfill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557. Within 5 feet of the wall, the backfill should be compacted with hand-operated equipment to at least 90 percent of the maximum dry density.

TEMPORARY EXCAVATIONS/SHORING

As currently planned, construction of the basement will require excavations up to approximately 16 feet deep below the existing grade. We anticipate the excavations to encounter dense to very dense Transitional Bed soil. All temporary excavations should be performed in accordance with

Part N of WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes and/or shoring.

Based on the subsurface conditions at the site, for planning purposes, it is our opinion that temporary excavations for the proposed construction may be sloped 1H:1V or flatter. In the lower portion of the excavation it may be possible for the temporary cut slope to ½H:1V or flatter, based on on-site observation and conditions. Based on our current understanding of the building layout, finished floor elevations, and the available construction easement, it appears that sufficient space is available for an unsupported open cut excavation along south, east, and north sides of the basement walls.

Ultrablock Wall Option

Along the west property line, where a 1H:1V cut may encroach on the property line, temporary shoring may be required. In this event, we recommend temporary shoring consisting of an Ultrablock wall be used to support excavations. The Ultrablock wall should have a maximum height of 10 feet (four blocks high) and installed with a 1H:10V batter, or flatter, combined with a 1H:1V slope above the wall, as needed. We recommend that the following be incorporated into the project plans:

- The maximum wall height of staggered blocks is 10 feet;
- The vertical wall face is no steeper than 1H (Horizontal):10V (Vertical);
- The subgrade at the base of the ultrablock shall consist of dense Transitional Bed material or leveling crushed rock placed on dense Transitional bed soil;
- No final excavation shall be made until blocks are available on site;
- The width of unsupported cut face for block placement shall be limited to no more than about 10 feet at any given time;
- Blocks shall be placed immediately after the cut is made, otherwise the cut face shall be buttressed with on-site soils until the blocks can be placed;
- Blocks should be staggered so there are no vertical seams;
- Any voids behind blocks shall be backfilled with 5/8” clean crushed rock immediately after the block wall are installed; and
- PanGEO shall provide full time observation during block wall installation.

The temporary excavations and cut slopes should be re-evaluated in the field during construction based on actual observed soil conditions, and may need to be flattened in the wet season and should be covered with plastic sheets. The cut slopes should be covered with plastic sheets in the rainy season. We also recommend that heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance equal to 1/3 the slope height from the top of any excavation.

Soldier Pile Wall Option

We anticipate that an Ultrablock wall and sloping will provide adequate temporary shoring for the planned excavation along the west property line. However, if the planned layout of the house changes, especially if the planned setback is reduced, or site conditions suggest an Ultrablock wall will not provide adequate support, a soldier pile wall is recommended. Specifically, soldier piles may be used at the location of the deepest cuts and Ultrablocks may be used where cut heights are less. Design recommendations for a cantilever wall or a wall with one row of tiebacks are presented in Figure 7.

If tiebacks are used, any tiebacks extending beyond your property will require a temporary construction easement for neighboring property owners.

The manner in which the tieback anchors carry load will depend on the type of anchor selected, the method of installation, and the soil conditions surrounding the anchor. Accordingly, we recommend use of a performance specification requiring the shoring contractor to install anchors capable of satisfactorily achieving the design structural loads, with a pullout resistance factor of safety of 2.0. For planning purposes, however, the anchors may be sized for an allowable skin friction value of 2 kips per lineal foot of anchor bond length, assuming that small diameter (about 6 inches) pressure-grouted tiebacks will be used. Post-grouting may also be needed in order to achieve the design capacity.

The actual capacity of the anchors should be checked with 200 percent verification tests. At least two 200% tests should be performed prior to installing production anchors. All production anchors should be proof tested to 130% of the design load. The anchor installations should be conducted in accordance with the latest edition of the Post Tensioning Institute (PTI) "Recommendations for Prestressed Rock and Soil Anchors". Elements of the testing are as follows:

Verification Tests (200% Tests)

- Prior to installing production anchors, perform a minimum of two tests each on each anchor type, installation method and soil type with the tested anchors constructed to the same dimensions as production anchors
- Test locations to be determined in conjunction and approved by the geotechnical engineer
- Test anchors, which will be loaded to 200% of the design load, may require additional prestressing steel (steel load not to exceed 80% of the ultimate tensile strength) or reinforcing of the soldier pile
- Load test anchors to 150% load in 25% load increments, holding each incremental load for at least 5 minutes and recording deflection of the anchor head at various times within each hold to the nearest 0.01inch.
- At the 150% load, the holding period shall be at least 60 minutes.
- After completion of the 150% hold, load the anchor in 25% load increments to the 200% load, which shall be held for 10 minutes
- A successful test shall provide a measured creep rate of 0.04 inches or less at the 150% load between 1 and 10 minutes, and 0.08 inches between 6 and 60 minutes, and both shall have a creep rate that is linear or decreasing with time. The applied load must remain constant during all holding periods (i.e. no more than 5% variation from the specified load).

Proof Tests (130% load tests on all production anchors)

- Load test all production anchors to 130% of the design load in 25% load increments, holding each incremental load until a stable deflection is achieved (record deflection of the anchor head at various times within each hold to the nearest 0.01inch)
- At the 130% load, the holding period shall be at least 10 minutes
- A successful test shall provide a measured creep rate of 0.04 inches or less at the 130% load between 1 and 10 minutes with a creep rate that is linear or decreasing with time. The applied load must remain constant during the holding period (i.e. no more than 5% variation from the 130% load). Anchors failing this proof testing creep acceptance criteria may be held an additional 50 minutes for creep measurement. Acceptable performance would equate to a creep of 0.08 inches or less between 5 and 50 minutes with a linear or decreasing creep rate.

Verification tested anchors or extended creep proof tested anchors not meeting the acceptance criteria will require a redesign by the contractor to achieve the acceptance criteria.

In the tieback construction, a bond breaker shall be constructed in the no load zone when the installation procedures use single stage grouting.

All tiebacks installed within 15 feet of the ground surface on private property shall be drilled and the tieback installed using full depth casing (i.e. no open hole drilling) to prevent excessive caving. Drill casing would also likely be needed to reduce the amount of sloughing of the erodible sandy outwash soils. All tiebacks should be designed to provide a minimum clearance of at least 5 feet from existing structures and at least 3 feet of clearance from utilities.

Shoring walls designed in accordance with the recommendations discussed above may be expected to deflect laterally and vertically about 1 inch or less. Ground settlements outside the excavation are expected to be less than 1 inch and practically negligible beyond 100 feet from the shoring wall.

The temporary excavations and cut slopes should be re-evaluated in the field during construction based on actual observed soil conditions, and may need to be flattered in the wet reasons and should be covered with plastic sheets. The cut slopes should be covered with plastic sheets in the raining season, especially as the sandy outwash soils are vulnerable to erosion. We also recommend that heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance equal to 1/3 the slope height from the top of any excavation.

STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

Depending on the type of compaction equipment used and depending on the type of fill material, it may be necessary to decrease the thickness of each lift in order to achieve adequate compaction. PanGEO can provide additional recommendations regarding structural fill and compaction during construction.

WET WEATHER EARTHWORK

In our opinion, the proposed site construction may be accomplished during wet weather (such as in winter) without adversely affecting the site stability. However, earthwork construction performed during the drier summer months likely will be more economical. Winter construction will require the implementation of best management erosion and sedimentation control practices to reduce the chance of off-site sediment transport. Some of the site soils are highly erodible, and the fine grained Transition Bed material may easily become disturbed and soft from construction traffic in wet conditions. Any footing subgrade soils that become softened either by disturbance or rainfall should be removed and replaced with structural fill, Controlled Density Fill (CDF), or lean-mix concrete. General recommendations relative to earthwork performed in wet conditions are presented below:

- Site stripping, excavation and subgrade preparation should be followed promptly by the placement and compaction of clean structural fill or CDF;
- The size and type of construction equipment used may have to be limited to prevent soil disturbance;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil;
- Structural fill should consist of less than 5% fines; and
- Excavation slopes should be covered with plastic sheets.

SURFACE DRAINAGE AND EROSION CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgrade perimeter ditches or low earthen berms in conjunction with silt fences to collect runoff and prevent water from entering excavations or to prevent runoff from the construction area from leaving the immediate work site. Temporary erosion control may require the use of hay bales on the downhill side of the project to prevent water from leaving the site and potential storm water detention to trap sand and silt before the water is discharged to a suitable outlet. All collected water should be directed under control to a positive and permanent discharge system.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design such that surface runoff is directed away from structures. Potential problems associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed addition, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements. The City of Kirkland, as part of the permitting process, may require geotechnical construction inspection services. PanGEO can provide you a cost estimate for construction monitoring services at a later date.

We anticipate that the following additional services will be required:

- Review final project plans and specifications
- Verify implementation of erosion control measures;
- Evaluate and confirm the stability of temporary excavation slopes;
- Observe soldier pile shoring installation;
- Verify adequacy of footing subgrade;
- Verify the adequacy of subsurface drainage installation;
- Confirm the adequacy of the compaction of structural backfill; and
- Other consultation as may be required during construction

Modifications to our recommendations presented in this report may be necessary, based on the actual conditions encountered during construction.

CLOSURE

We have prepared this report for Mr. Dallas Evans and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions may exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at the site that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our work specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

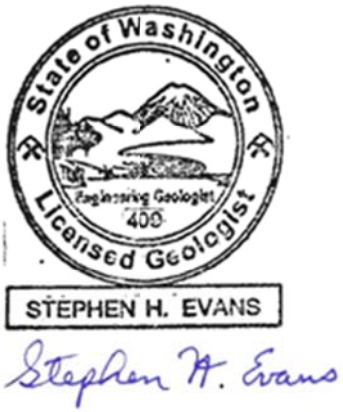
This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report

be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

We appreciate the opportunity to be of service.

Sincerely,



W. Paul Grant, P.E.
Principal Geotechnical Engineer

Stephen H. Evans, L.E.G
Senior Engineering Geologist

Enclosures:

Figure 1	Vicinity Map
Figure 2	Site and Exploration Plan
Figure 3	Terms and Symbols for Boring and Test Pit Logs
Figure 4	Log of Test Pit TP-1
Figure 5	Log of Test Pit TP-2
Figure 6	Log of Test Pit TP-3
Figure 7	Shoring Design Parameters Cantilever Wall / Single Tieback

REFERENCES

City of Seattle, 2011, *Standard Specifications for Road, Bridges, and Municipal Construction.*

International Code Council, 2012, *International Building Code (IBC).*

Minard, J.P., 1983, *The Geologic Map of the Kirkland Quadrangle, Washington – U. S. Geological Survey Miscellaneous Field Studies Map MF-1543, scale 1:24,000.*

WSDOT, 2014, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10.*

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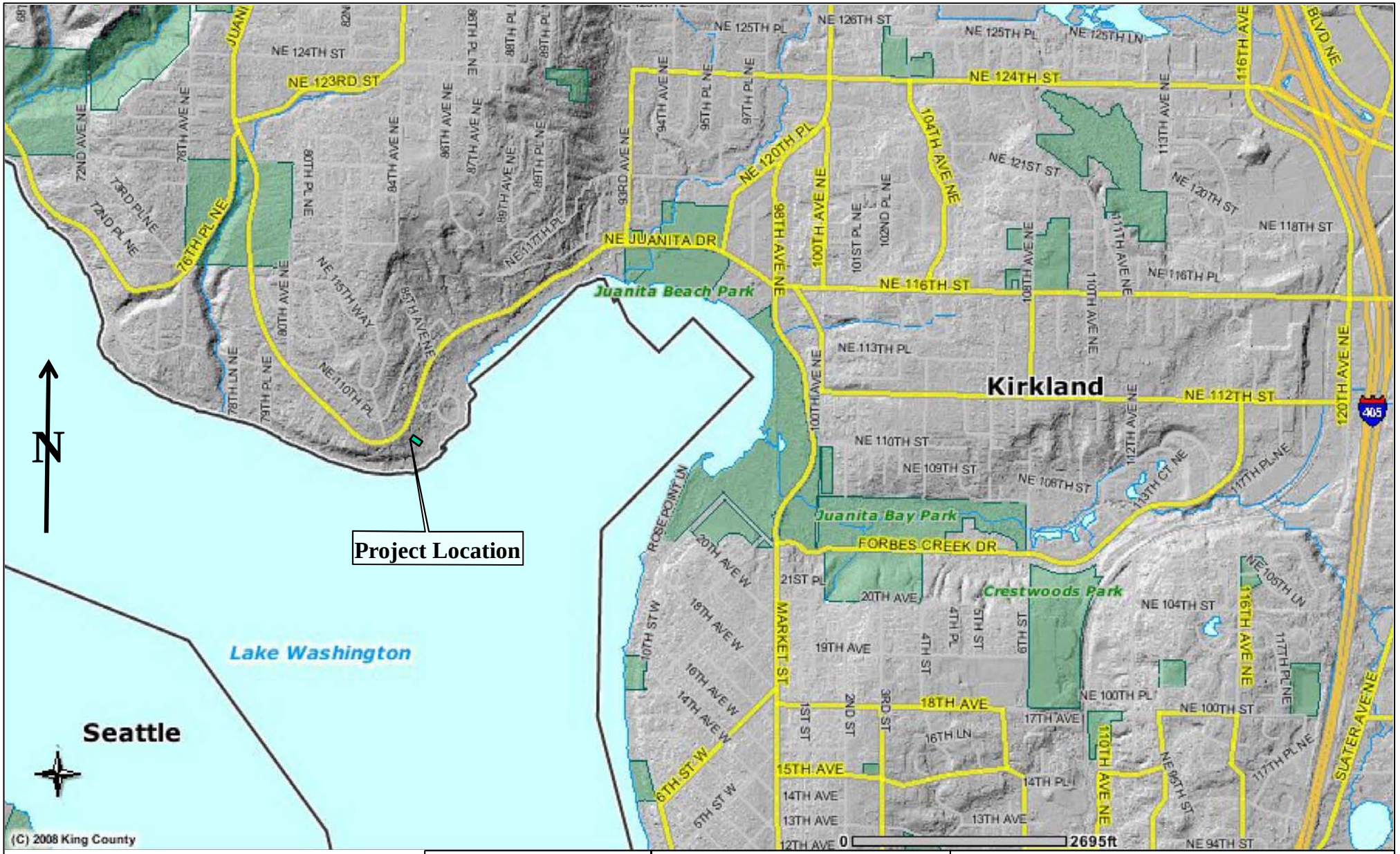

PanGEO INCORPORATED

Proposed Residence
8331 NE Juanita Drive, Lot B
Kirkland, Washington

VICINITY MAP

Project No.	Figure No.
15-057.100	1

PROPOSED EASEMENT

EXISTING EASEMENT PER SHORT PLAT S92S0094

20.0'

CB 250A RIM=71.98

CB 250A RIM=47.28

N 56°37'47" W 532.18' (MEAS) 532.31' (REF 3)

N 89°54'30" E (MEAS) 119.31' (REF 3) 122.48' (MEAS)

FOUND REBAR & CAP LS# 12336 (HELD) POINT "A"

747" W (CALC'D)

34" FIR

72.21'

28" MADRONA

64.63'

95.56'

59.35'

12" CEDAR

20.0'

2(6") HOLLY

22" CEDAR

16" ALDER

30" FIR

28" FIR

22" FIR

TP-1

TP-2

TP-3

LOT A

PROPOSED EASEMENT

Plate 1 Locale

Approx. Area Of Excavation

LOT B

17" FIR

12" CEDAR

8" CHERRY

6" CONCRETE RETAINING WALL

2(17")

Upper Garage Foundation Grade 56 ft.

Excavation Maximum 15-16 feet ~15 foot setback

Main House Foundation Grade 42 ft.

SET REBAR & CAP GEO-D LS# 51800

Base map provided by GeoDimentions, August, 2015. Elevations are base on The NAVD88 Datum.

Approximate Scale 1":20'

Legend:

TP-1 PanGEO Test Pit

PanGEO INCORPORATED

Proposed Residence
8331 NE Juanita Drive, Lot B
Kirkland, Washington

SITE AND EXPLORATION PLAN

Project No.	Figure No.
15-057.100	2

15057.100_Site_Plan_F-2.ppt 10/14/2015(10:12 AM) she

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes: 1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered: Units of material distinguished by color and/or composition from material units above and below

Laminated: Layers of soil typically 0.05 to 1mm thick, max. 1 cm

Lens: Layer of soil that pinches out laterally

Interlayered: Alternating layers of differing soil material

Pocket: Erratic, discontinuous deposit of limited extent

Homogeneous: Soil with uniform color and composition throughout

Fissured: Breaks along defined planes

Slickensided: Fracture planes that are polished or glossy

Blocky: Angular soil lumps that resist breakdown

Disrupted: Soil that is broken and mixed

Scattered: Less than one per foot

Numerous: More than one per foot

BCN: Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

CBR	California Bearing Ratio
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

LOG KEY 07-188 MONROE.GPJ PANGEO.GDT 2/6/08

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Terms and Symbols for Boring and Test Pit Logs

Figure 3

Project:	Proposed Residence	Surface Elevation:	
Job Number:	15-057.100	Top of Casing Elev.:	
Location:	8331 NE Juanita Drive, Lot B, Kirkland, WA	Excavation Method:	Test Pit
Coordinates:	not surveyed	Sampling Method:	Grab

Depth, (ft)	Sample No.	Sample Type	In Situ Tests	Other Tests	Symbol	MATERIAL DESCRIPTION
0						Loose, dark gray, organic SILT and fine SAND: moist. (Topsoil).
	G-1					Loose, to medium dense, red to yellow brown, fine to medium SAND with silt: moist, some gravel, non-plastic, homogeneous, massive. (Vashon Recessional Outwash).
2						Grading to yellow brown.
4	G-2					Medium dense to dense, gray, gravelly, fine to coarse SAND: moist, some non-plastic silt, homogeneous. (Vashon Advanced Outwash).
6	G-3					
8						Bottom of Test Pit.
10						
12						

PL Moisture LL

0 50 100

Completion Depth:	7.5ft
Date Test Pit Started:	3/10/15
Date Test Pit Completed:	3/10/15
Logged By:	S. Evans
Excavation Company:	Northwest Excavating

Remarks: No groundwater observed in test pit.

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LOG OF TEST PIT TP-1

Figure 4

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF TEST PIT 15-057 8329 NE JUANITA LOGS.GPJ PANGEO.GDT 9/4/15

Project:	Proposed Residence	Surface Elevation:	
Job Number:	15-057.100	Top of Casing Elev.:	
Location:	8331 NE Juanita Drive, Lot B, Kirkland, WA	Excavation Method:	Test Pit
Coordinates:	not surveyed	Sampling Method:	Grab

Depth, (ft)	Sample No.	Sample Type	In Situ Tests	Other Tests	Symbol	MATERIAL DESCRIPTION
0						Loose, dark gray, organic SILT and fine SAND: moist. (Topsoil).
						Loose, to medium dense, red to yellow brown, fine to medium SAND with silt: moist, some gravel, cobbles, non-plastic, homogeneous, massive. (Vashon Recessional Outwash).
2						Grading to yellow brown.
						Medium dense to dense, gray, fine to coarse SAND with gravel: moist, some non-plastic silt, cobbles throughout, homogeneous, massive. (Vashon Advanced Outwash).
4						
6						Bottom of Test Pit.
8						
10						
12						

PL Moisture LL

0 50 100

Completion Depth:	6.0ft
Date Test Pit Started:	3/10/15
Date Test Pit Completed:	3/10/15
Logged By:	S. Evans
Excavation Company:	Northwest Excavating

Remarks: No groundwater observed in test pit.

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Phone: 206.262.0370

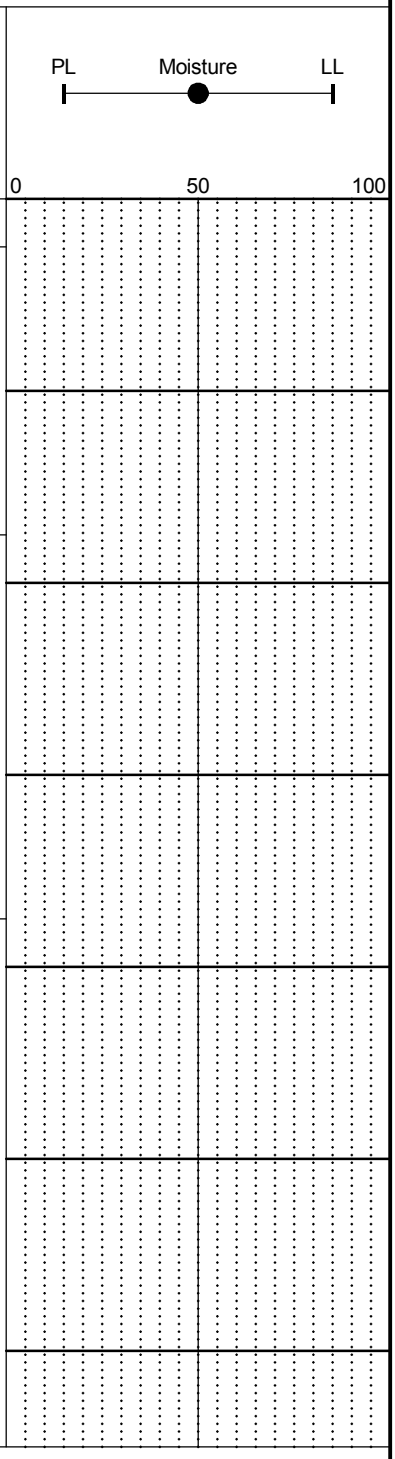
LOG OF TEST PIT TP-2

Figure 5

The stratification lines represent approximate boundaries. The transition may be gradual.

Project:	Proposed Residence	Surface Elevation:	
Job Number:	15-057.100	Top of Casing Elev.:	
Location:	8331 NE Juanita Drive, Lot B, Kirkland, WA	Excavation Method:	Test Pit
Coordinates:	not surveyed	Sampling Method:	Grab

Depth, (ft)	Sample No.	Sample Type	In Situ Tests	Other Tests	Symbol	MATERIAL DESCRIPTION
0						Loose, dark gray, organic SILT and fine SAND: moist. (Topsoil).
						Loose, to medium dense, red to yellow brown, fine to medium SAND with silt: moist, some gravel, cobbles, non-plastic, homogeneous, massive. (Vashon Recessional Outwash).
2						Grading to yellow brown.
4						Medium dense to dense, gray, gravelly, fine to coarse SAND: moist, trace non-plastic silt, cobbles, homogeneous, massive. (Vashon Advanced Outwash).
6						
8						Bottom of Test Pit.
10						
12						



Completion Depth:	6.0ft
Date Test Pit Started:	3/10/15
Date Test Pit Completed:	3/10/15
Logged By:	S. Evans
Excavation Company:	Northwest Excavating

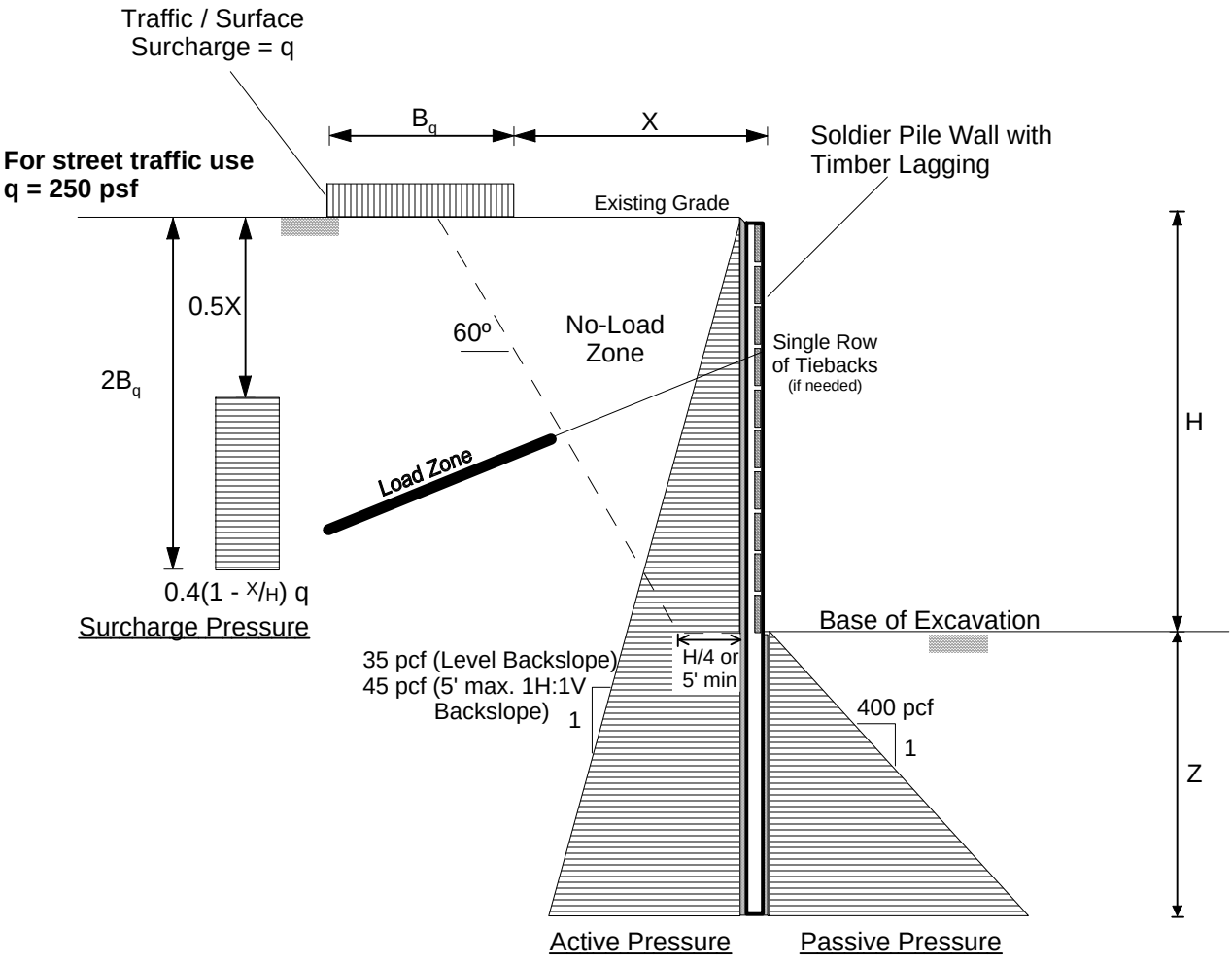
Remarks: No groundwater observed in test pit.

PanGEO INCORPORATED
Phone: 206.262.0370

LOG OF TEST PIT TP-3

Figure 6

The stratification lines represent approximate boundaries. The transition may be gradual.



Notes:

1. Embedment (Z) should be determined by summation of moments at the bottom of the soldier piles or at ground anchor location if present. Minimum pile embedment shall be 10 feet.
2. A factor of safety of 1.5 has been applied to the recommended passive earth pressure value. No factor of safety has been applied to the recommended active earth pressure values.
3. Active and surcharge pressures should be applied over the full width of the pile spacing above the base of the excavation, and over one pile diameter below the base of the excavation.
4. Passive pressure should be applied to two times the diameter of the soldier piles.
5. Use uniform earth pressure of 200 psf and 250 psf for lagging design with soldier piles spaced at less than or equal to 8 feet and greater than 8 feet, respectively.
6. Refer to report text for additional discussions.

PanGEO INCORPORATED	**Proposed Residence** **8331 NE Juanita Drive, Lot B** **Kirkland, Washington**	**SHORING DESIGN PARAMETERS** **CANTILEVER WALL / SINGLE TIEBACK**
		Project No. **15-057.100** | Figure No. **7**

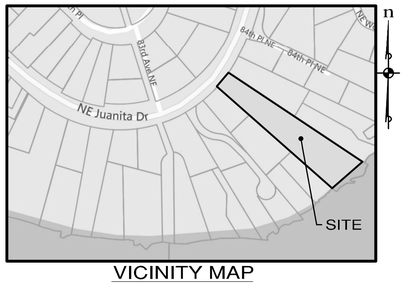
15-057 Fig 7 Soldier Pile EP - Cantl - 1 tie.grf 10/14/15(15:44) JCR

7. OTHER PERMITS

Other permits may include building permits for walls, if over 4 feet in height.

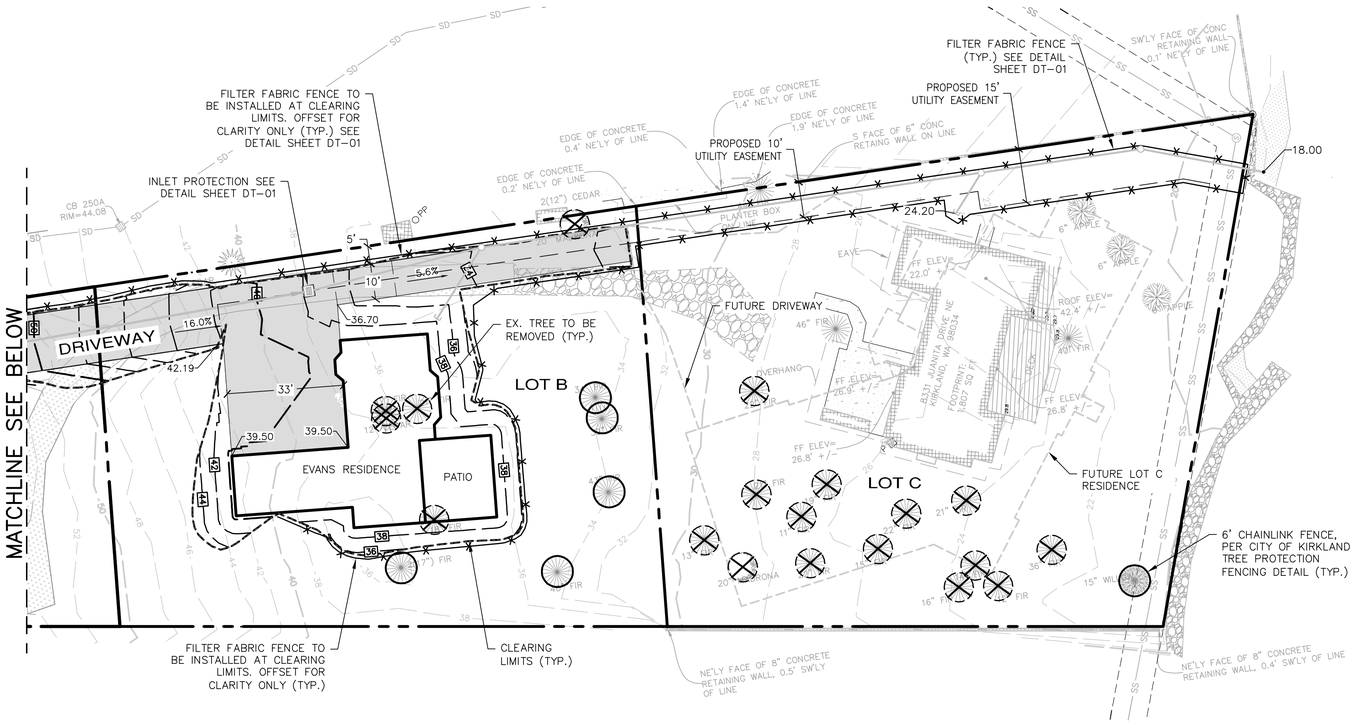
8. ESC Plan

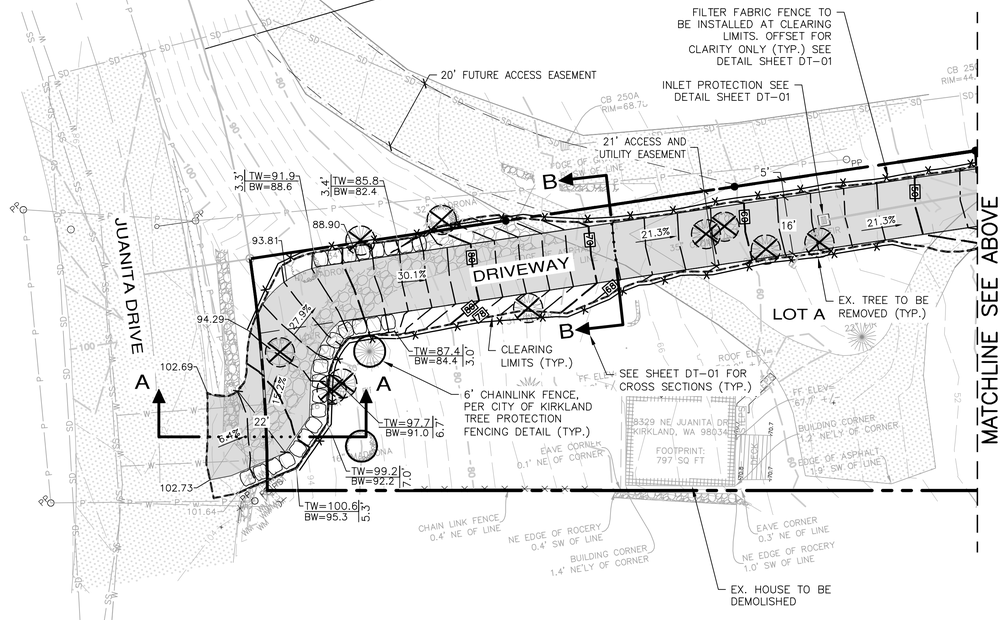
The proposed project will include clearing and grading on Lots B and C for the proposed Lot B residence and the proposed driveway. The Temporary Erosion and Sedimentation Control (TESC) Plan is shown on sheet ER-01. The TESC Plan was developed in accordance with criteria in the SWDM. Clearing limits will be clearly marked and silt fence will be installed, as necessary, to prevent, to the maximum extent possible, the transport of sediment from the project site to Lake Washington. Trees to be preserved will have 6 foot temporary chain link fence installed at the critical root zone.



VICINITY MAP
NTS

A PORTION OF SW 1/4 OF THE NW 1/4 OF SEC. 31, TWP. 26N., RGE. 05E., W.M.





SCALE: 1" = 20'
20 10 0 20 40
CONTOUR INTERVAL = 2'

NOTES:

1. THE EXISTING FEATURES SHOWN ON THIS PLAN ARE FROM GEO DIMENSIONS. SURVEY WAS PROVIDED TO E.S.M. LLC ON 02/26/2016. E.S.M. LLC ASSUMES NO LIABILITY FOR THE ACCURACY OF THAT INFORMATION AND HAS BASED THEIR DESIGN ON THAT INFORMATION.
2. SEE SHEET DT-01 FOR DETAILS AND CROSS SECTIONS.

LEGEND

- CLEARING LIMITS
- FILTER FABRIC FENCE
- 30 EXISTING CONTOUR
- 30 PROPOSED CONTOUR
- TREE TO BE REMOVED
- TREE PROTECTION

LOT A

APPROXIMATE EARTHWORK QUANTITIES	
CUT	= 32 cu yds.
FILL	= 410 cu yds.
TOTAL	= 378 net cu yds. FILL

LOT B

APPROXIMATE EARTHWORK QUANTITIES	
CUT	= 108 cu yds.
FILL	= 343 cu yds.
TOTAL	= 235 net cu yds. FILL

SITE DATA

ADDRESS: 8331 JUANITA DR.
KIRKLAND, WA 98034

PARCEL #: 3760500240, 3760500241, 3760500242

VERTICAL DATUM

NAVD 88

BASIS OF BEARING

PER RECORD OF SURVEY BOOK 28, PAGE 284, THE NORTHEASTERLY LINE OF THRACT 40 BEARS N56°37'47"W BETWEEN FOUND REBAR AND CAPS AND POINTS "A" AND "B".

LEGAL DESCRIPTION

JUANITA POINT A RESIDENCE PARK LOT B KC LEGAL LOT STATUS #L10M0010 DTD 6-9-2010 SD LLS BASED ON REC #20071001001233 BEING TRACT 40 SD ADD TGW UND INT IN COMMUNITY BEACH FOR ASSESSMENT PURPOSES ONLY

JUANITA POINT A RESIDENCE PARK LOT A KC LEGAL LOT STATUS #L10M0010 DTD 6-9-2010 SD LLS BASED ON REC #20071001001233 BEING TRACT 40 SD ADD TGW UND INT IN COMMUNITY BEACH FOR ASSESSMENT PURPOSES ONLY

JUANITA POINT A RESIDENCE PARK LOT C KC LEGAL LOT STATUS #L10M0010 DTD 6-9-2010 SD LLS BASED ON REC #20071001001233 BEING TRACT 40 SD ADD TGW UND INT IN COMMUNITY BEACH FOR ASSESSMENT PURPOSES ONLY

Call 2 Working Days Before You Dig
811
Utilities Underground Location Center
(ID,MT,ND,OR,WA)

REVISIONS

NO.	DESCRIPTION/DATE	BY

LARA G. BARTENHAGEN — STATE OF WASHINGTON — 49111 — REGISTERED PROFESSIONAL ENGINEER

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KIRKLAND WASHINGTON

JOB NO.:	1898-001-016
DWG. NAME:	ER-01
DESIGNED BY:	LBG
DRAWN BY:	CJR
CHECKED BY:	
DATE:	03/09/2016
DATE OF PRINT:	

ER-01

1 OF 3 SHEETS

File: \\esm8\engr\esm-jobs\1898\001\016\plots\ER-01.dwg
Plotted: 3/9/2016 1:36 PM
Plotted By: Carl Roberts

9. BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT

Based on the drainage review designations for all three lots, the project site is not required to provide Bond Quantities, Facility Summaries, and Declaration of Covenant.

10. OPERATIONS AND MAINTENANCE MANUAL

Based on the drainage review designations for all three lots, the project site is not required to provide an operations and maintenance manual.